

Patent claims (amended version)

1. Dust-collecting filter formed from an air-permeable filter material, an adsorbing agent being contained in loose form in the dust-collecting filter, **characterised in that** the adsorbing agent comprises fibres, flakes and/or granulate as a supporting material onto which a powdery adsorption material is applied superficially.
2. Dust-collecting filter according to claim 1, **characterised in that** the adsorption material is applied in an amount of 1 to 50 wt-% of the supporting material.
3. Dust-collecting filter according to claim 2, **characterised in that** 7 to 25 wt-% are applied.
4. Dust-collecting filter according to at least one of claims 1 to 3, **characterised in that** the adsorption material is selected from active charcoal, impregnated active charcoal, functionalised carbon, hydrophobic zeolites, hydrophobic, porous polymers, bentonites and/or crystalline organometallic complexes.
5. Dust-collecting filter according to claim 4, **characterised in that** the functionalised carbon is an aromatic carbon skeleton with functional groups.

6. Dust-collecting filter according to claim 4,
characterised in that the active charcoal is
coconut shell, wood, rock or bamboo charcoal.
- 5 7. Dust-collecting filter according to claim 4 or 5,
characterised in that the active charcoal is
impregnated with acid or basic chemicals and/or
with silver salts.
- 10 8. Dust-collecting filter according to claim 4,
characterised in that the zeolites have micropores
of a pore size $> 5 \text{ \AA}$.
- 15 9. Dust-collecting filter according to claim 8,
characterised in that the pore size of the
micropores is $> 6.5 \text{ \AA}$.
- 20 10. Dust-collecting filter according to claim 8 or 9,
characterised in that the specific surface of the
zeolites is $> 400 \text{ m}^2/\text{g}$.
- 25 11. Dust-collecting filter according to at least one
of claims 8 to 10, **characterised in that** the
zeolites have a modulus > 200 , preferably > 300 .
- 30 12. Dust-collecting filter according to at least one
of claims 8 to 11, **characterised in that** the
particle size of the zeolites is in the range
between 2 and 30 \mu m .
13. Dust-collecting filter according to claim 4,
characterised in that the porous polymers have
micropores of 6 to 20 \AA , mesopores of 20 to 500 \AA
and macropores $> 500 \text{ \AA}$.

14. Dust-collecting filter according to claim 4 or 13,
characterised in that the average pore diameter is
between 3 and 300 Å.
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15. Dust-collecting filter according to claim 4, 13 or
14, **characterised in that** the particle size of the
porous polymers is in the range between 1 and 500
µm, preferably between 1 and 200 µm.
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16. Dust-collecting filter according to at least one
of claims 4, 13 to 15, **characterised in that** the
pore volume is $\geq 0.4 \text{ cm}^3/\text{g}$.
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17. Dust-collecting filter according to at least one
of claims 4, 13 to 15, **characterised in that** the
porous polymers are hydrophobic.
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18. Dust-collecting filter according to at least one
of claims 4, 13 to 17, **characterised in that** the
porous polymers are constructed from styrene,
acrylic acid and/or their derivatives.
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19. Dust-collecting filter according to at least one
of claims 1 to 18, **characterised in that** the
adsorption material is chemically and/or
physically bound to the supporting material.
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20. Dust-collecting filter according to at least one
of claims 1 to 19, **characterised in that** the
adsorption material is bound to an
electrostatically charged supporting material.

21. Dust-collecting filter according to at least one of claims 1 to 20, **characterised in that** the adsorption material is powdery and has a mean particle size of 1 to 100 μm .
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22. Dust-collecting filter according to at least one of claims 1 to 21, **characterised in that** the supporting material comprises fibres which are selected from chemical fibres and/or natural
- 10 fibres.
23. Dust-collecting filter according to claim 22, **characterised in that** the fibres are rendered antibacterial.
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24. Dust-collecting filter according to claim 22 or 23, **characterised in that** the chemical fibres are cellulose fibres such as viscose and/or synthetic fibres.
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25. Dust-collecting filter according to claim 24, **characterised in that** the synthetic fibres are selected from fibres formed from polyolefins, polyester, polyamides, polyacrylonitrile and/or
- 25 polyvinyl alcohol.
26. Dust-collecting filter according to claim 22 or 23, **characterised in that** the natural fibres are selected from cellulose, wood fibre materials,
- 30 kapok, flax, jute, Manila hemp, coco, wool, cotton, Kenaf, abaca, mulberry bast and/or fluff pulp.

27. Dust-collecting filter according to at least one of claims 22 to 26, **characterised in that** the fibres are smooth, branched, crimped, hollow and/or textured and have a non-circular (e.g. trilobal) cross-section.
28. Dust-collecting filter according to at least one of claims 22 to 27, **characterised in that** the fibres have a mean length of between 0.3 mm and 100 mm, preferably between 0.5 and 70 mm.
29. Dust-collecting filter according to claim 28, **characterised in that** the fibres have a mean length of 1 to 9.5 mm.
30. Dust-collecting filter according to at least one of claims 1 to 29, **characterised in that** the supporting material comprises flakes which are selected from cellular plastics, non-wovens, textiles, foamed starch, foamed polyolefins, as well as films and recovered fibres.
31. Dust-collecting filter according to claim 30, **characterised in that** the flakes have a diameter of 0.3 mm to 30 mm, preferably 0.5 to 20 mm.
32. Dust-collecting filter according to claim 31, **characterised in that** the flakes have a diameter of 1 to 9.5 mm.
33. Dust-collecting filter according to at least one of claims 1 to 32, **characterised in that** the supporting material comprises granulates which are selected from macroporous polymers.

34. Dust-collecting filter according to claim 33,
characterised in that the particle size of the
granulates is in the range between 0.2 and 1.5 mm,
5 preferably between 0.3 and 1.0 mm.
35. Dust-collecting filter according to claim 33 or
34, **characterised in that** the macroporous polymers
are constructed from polystyrene, acrylic acid
10 and/or their derivatives.
36. Dust-collecting filter according to at least one
of claims 33 to 36, **characterised in that** the
surface of the macroporous polymers is $> 200 \text{ m}^2/\text{g}$,
15 preferably $> 350 \text{ m}^2/\text{g}$.
37. Dust-collecting filter according to at least one
of claims 33 to 36, **characterised in that** the
porosity $\geq 0.4 \text{ ml/ml}$.
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38. Dust-collecting filter according to at least one
of claims 1 to 37, **characterised in that** the
adsorbing agent is enclosed in an air-permeable
wrapper.
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39. Dust-collecting filter according to claim 38,
characterised in that the wrapper is an air-
permeable non-woven.
- 30 40. Dust-collecting filter according to one of claims
1 to 39, **characterised in that** 0.03 to 5 g of the
adsorbing agent per 1000 cm^3 are contained in the
dust-collecting filter.

41. Dust-collecting filter according to claim 40,
characterised in that 0.3 to 2 g adsorbing agent
are contained per 1000 cm³.
- 5 42. Dust-collecting filter according to one of claims
1 to 41, **characterised in that** the adsorbing agent
is present in a bag, which has an air-permeable
wrapper, in the dust-collecting filter.
- 10 43. Dust-collecting filter according to claim 42,
characterised in that the adsorbing agent is
arranged under a covering in part of the inner
surface of the dust-collecting filter.
- 15 44. Dust-collecting filter according to claim 43,
characterised in that the covering is a non-woven
layer.
- 20 45. Dust-collecting filter according to claim 43,
characterised in that the adsorbing agent is
contained in a pad which is arranged on part of
the inner surface of the dust-collecting filter.
- 25 46. Dust-collecting filter according to claim 45,
characterised in that the pad comprises at least
one layer of a filter paper or of a special non-
woven, the adsorbing agent arranged on the surface
of the filter paper being covered by at least one
non-woven layer.
- 30 47. Dust-collecting filter according to at least one
of claims 42 to 46, **characterised in that** the
wrapper material of the bag or the covering is

formed from a material which can be destroyed under operating conditions.

- 5 48. Dust-collecting filter according to at least one of claims 1 to 47, **characterised in that** the dust-collecting filter is of such dimensions and design that it can be operated with a volume flow rate of 10 cm³/h to 400 m³/h.
- 10 49. Dust-collecting filter according to at least one of claims 1 or 40, **characterised in that** the filter material of the dust-collecting filter is a single-layer or multilayer paper and/or non-woven material.
- 15 50. Dust-collecting filter according to at least one of claims 1 to 49, **characterised in that** it is a vacuum-cleaner bag.
- 20 51. Dust-collecting filter according to at least one of patent claims 1 to 49, **characterised in that** it is a pleated filter or bag filter.
- 25 52. Method for adsorbing odours with a dust-collecting filter, **characterised in that** a dust-collecting filter according to one of claims 1 to 51 is used for it.
- 30 53. Method according to claim 52, **characterised in that** 0.2 to 5 g adsorbing agent are used per 1000 cm³ dust-collecting filter.
54. Method according to claim 52 or 53, **characterised in that** the adsorbing agent is introduced into the

dust-collecting filter before the start of a first suction process or at the start of the suction process.

5 55. Method according to at least one of claims 52 or
54, **characterised in that** the adsorbing agent is
present in a wrapper and is introduced into the
dust-collecting filter before the start of a first
suction process or at the start of the suction
10 process.

56. Method according to claim 55, **characterised in
that** the wrapper is so selected that it is
destroyed at the given volume flow rate.

15 57. Method according to at least one of claims 52 to
56, **characterised in that** this is a method for
vacuum-cleaning using a cylinder vacuum-cleaner or
an upright vacuum-cleaner.

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